BLM Technical Note 377

LOCATING SHARP-TAILED GROUSE LEKS FROM COLOR INFRARED AERIAL PHOTOGRAPHY

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BLM Technical Note 377 presents information on locating sharp-tailed grouse leks from color infrared aerial photography. Sharp-tailed grouse mate, nest, feed, raise broods, and winter within 1.5 miles of leks. Thus, if lek locations are known, crucial yearlong habitat can be identified.

Color infrared aerial photography was used to identify potential sharp-tailed grouse leks, two-thirds of which were verified on field checks in the follow-

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LOCATING SHARP-TAILED GROUSE LEKS FROM COLOR INFRARED AERIAL PHOTOGRAPHY

by

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ing years. The technique is valuable and cost-effective: the number of known leks in BLM's Phillips Resource Area, Montana, increased from 30 to 291 as a direct result of using this procedure.

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1 Attachment
1 - Locating Sharp-Tailed Grouse Leks From Color Infrared Aerial Photography (10 pp)

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INTRODUCTION

Locating sharp-tailed grouse (*Pedidecetes phasianellus*) leks is important in identifying and evaluating their habitat. Sharp-tailed grouse mate, nest, rest, feed, raise broods, and winter within 1.5 miles (3.2 km) of leks (Pepper 1972; Sission 1976; Yde 1977; Nielson 1978). Thus, if lek locations are known, crucial yearlong habitat can be identified.[1]

Sharp-tail leks are traditionally located with a ground linear survey (Folker 1960). This involves driving roads and trails during early morning from .5 hours before sunrise to 2 hours after sunrise on clear, calm days during the peak of the breeding season in April to mid-May. Stops are made at 1-mile (1.6-km) intervals to listen for displaying grouse. When displaying grouse are seen or heard, the lek site is located and plotted on a map or photo. The most a biologist can survey in a field season is about 25,000 acres (10,000 ha) because effective survey days are lost to inclement weather and because linear surveys are time-consuming. Consequently, the large areas covered in present-day planning documents, environmental impact statements, and other reports cannot be surveyed with this technique within normal time constraints. This paper presents an alternate method for survey of sharp-tailed grouse leks which has proven practical under field circumstances in the northern Great Plains of Montana.

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1 Crucial habitats are defined as portions of the habitats of sensitive species that if destroyed or adversely modified could result in their being listed as threatened or endangered pursuant to Section 4 of the Endangered Species Act or in some category implying endangerment by a State agency or legislature. Examples of crucial habitat areas are booming grounds, nesting areas, brood-rearing areas, winter ranges, migration routes, anadromous fish spawning grounds, fish-rearing waters, or any habitat necessary to the survival of the species in question at an important period of their life cycles.

PROCEDURES

Study Area. The Phillips Resource Area (Phillips RA), a detached office of the Bureau of Land Management's Lewistown District, is located in northcentral Montana. It encompasses 2.9 million acres (1.17 million ha) of which 1.3 million acres (.52 million ha) are in Federal ownership. Much of the area is rolling wheatgrass-blue grama grasslands cut by small drainages and interspersed with small grain crops which provide components of crucial yearlong sharp-tail habitat.

Photo Interpretation. During the winter of 1978-79, a BLM resource specialist analyzed color infrared (CIR) aerial photography (Aerochrome IR Type 2443 in 9-inch x 9-inch [23-cm x 23-cm] format) of the Phillips RA flown in June and July of 1977 to identify possible leks. The photography was acquired for use by several programs within the Resource Area; it was not specifically obtained for this project. The scale of the photography was 1:31,680 (2 inches = 1 mile). Film-strips were viewed on a Richards model GFL-940 light table. An Old Delft Scanning Stereoscope at 4.5x magnification was used if there was a question on a possible lek. Approximately 1,000 transparencies were viewed in the interpretation.

Thirty known leks from previous ground linear surveys were plotted on the CIR transparencies to establish interpretation criteria. These leks appeared as small white to pinkish-white dots against a darker vegetative background on the transparencies (Figure 1). These dots possessed a unique color, shape, and texture and were usually situated near drainages.

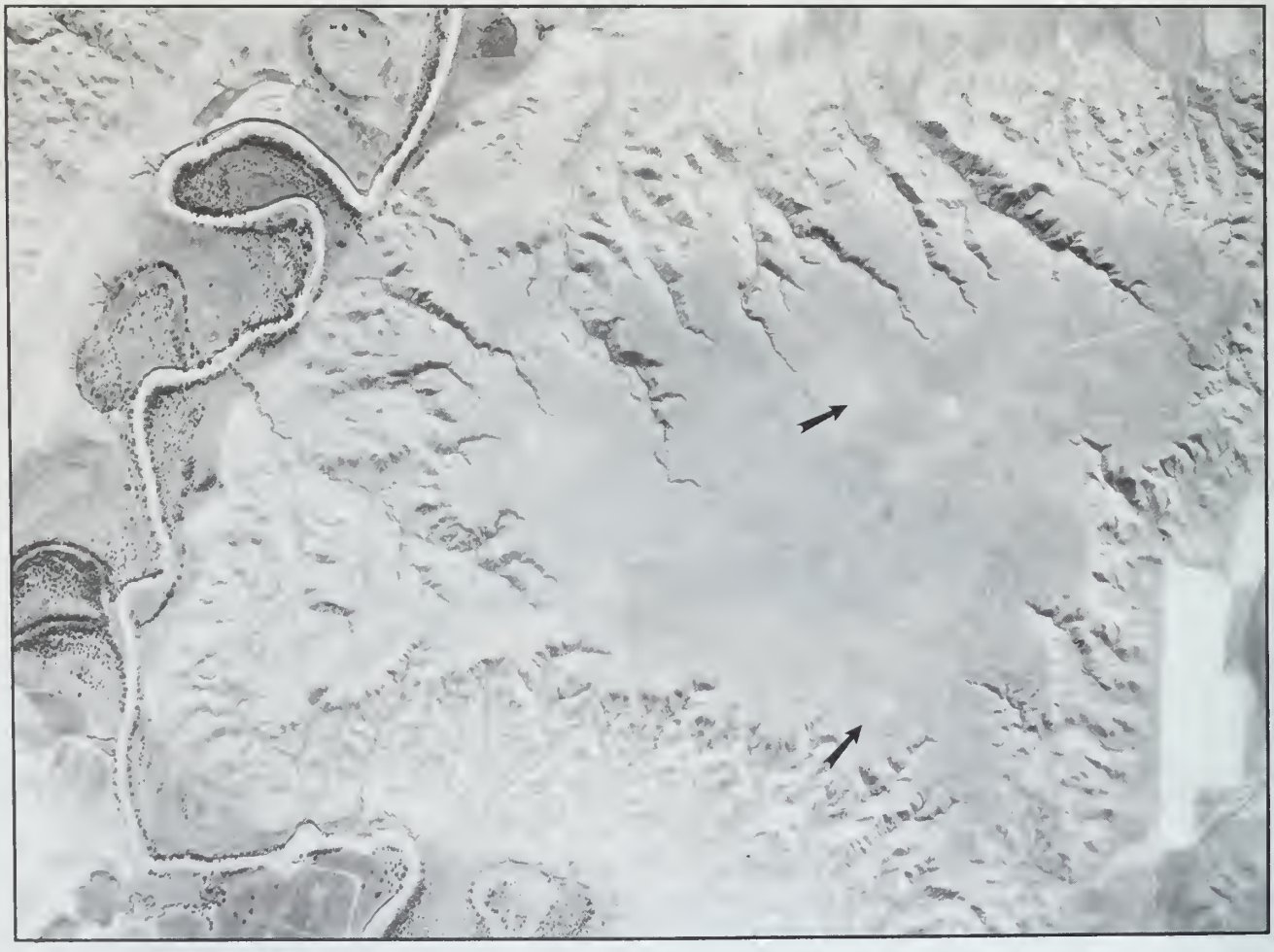

Figure 1. Two sharp-tailed grouse leks (shown by arrows) as they appear on aerial photography. This black-and-white print was produced from the original CIR transparency.

Increased bare ground and light reflectance on the lek produced the white to pinkish-white color on the photos. Vegetation surrounding the lek was generally at peak photosynthetic activity (vegetation peak-of-green) by mid-June while the vegetation on the lek was set back by grouse utilization and not at peak-of-green. CIR photography taken during this period provided contrast in vegetational cover inside and outside the lek.

Each transparency was systematically scanned (visually examined) for possible leks. Scanning began in the upper left-hand corner and went back and forth across the photo from top to bottom. After the familiarization process was completed and the criteria for lek identification established, locations of all possible leks were identified and transferred to acetate film overlays attached to black-and-white copies (1:31,680) of the CIR photos for use in field verification. Locations were also transferred to small-scale 1:125,000 (.5 inch = 1 mile) maps which were used to plan aerial travel routes.

Field Verification. A Bell 47 G3B1 three-passenger helicopter was used to field-check the photo interpretation during early May 1979 and 1980. A Cessna 206 with STOL kit (used for slow flying) was used in 1981. Early-morning flights were scheduled to coincide with grouse activities on leks. Leks were considered active if grouse were displaying or if there was evidence of recent activity such as feathers, trampled vegetation, or droppings.

RESULTS

The photo interpretation in 1978-79 located 404 possible leks in the study area; 133 leks were field-checked during May 1979 in 13.7 hours with the helicopter. In May 1980, 78 possibles were field-checked in 8.5 hours with the helicopter. The Cessna 206 was used to field-check 193 possibles in 22.6 hours during late April-May of 1981. During the 3 years of field verification, 261 possibles were confirmed as active, a success rate of 65 percent.

The traditional ground linear survey is time-consuming and expensive when compared with the CIR photo interpretation technique. In fact, a wildlife biologist could never complete a survey of an area the size of Phillips County. The photo-based inventory took 6 weeks of office time (4 weeks for photo interpretation plus 2 weeks for data transfer to field photos) and 3 weeks of field time and 45 hours of flying time. Approximately 10 leks were checked per hour from an aircraft.

To accomplish a field survey such as this, a team of 24 biologists could survey Phillips RA in 5 years at a cost of $294,000 to $397,000. Comparatively, the aerial survey would require one biologist, cost $13,290 to $14,574 and be completed in one field season (Table 1).

The CIR photography technique is designed to locate leks on a given area in a very short time. Results of the technique indicate the number of active leks in the study area at a given point in time. It is then the responsibility of a wildlife biologist to determine crucial yearlong habitat and how the habitat should be managed. Any other studies would be conducted from the ground.

Trend studies for sharp-tailed grouse in Phillips County indicated a large population in 1977. In 1979 to 1981 the population decreased, probably because of drought. Studies by Pepper (1972) and Sisson (1976) indicate that some sharp-tail populations change leks each year (15 to 50 percent). Neilson (1978) in the northern portion of Phillips County did not find this to be so. Males did not utilize a number of leks, but were dependent on one lek during his study. In a 4-year study by Yde (1977) and Neilson (1978), all leks were active in their study area; no new leks were established and no existing leks were abandoned. However, the number of males which utilized each lek varied in relation to the population trend.

The aerial technique is a one-time look at each lek. This created a problem when the lek active in 1977 was found to be abandoned when field-checked in 1979-81. If the leks could be visited the year following the photography, the survey success would increase. The 65 percent success rate, therefore, is probably a minimum. In any case, the most important benefit of this project was that over 260 previously unidentified sharp-tailed grouse leks were discovered in the Phillips RA.

Table 1. Cost of linear vs. aerial survey of leks in Phillips Resource Area, Montana.

Grade (GS)	Gross Salary[1]	Vehicle Cost[2]	Helicopter Cost[3]	Total Cost Linear Survey[4]	Total Cost Aerial Survey[5]
5	$553.46	$792.75	$10,800	$294,375.60	$13,290.57
7	685.54	792.75	10,800	341,924.40	13,884.93
9	838.62	792.75	10,800	397,033.20	14,573.79

1 Schedule of salary rates as of October 1986 for 2 weeks.

2 A four-wheel drive vehicle at $138.50 per month plus 19.5¢ per mile. Assuming 100 miles per day over a 6-week period (30 working days) or 3,000 miles.

3 Assuming 10 leks per hour, it will take approximately 45 hours to verify the 404 potential leks. Rental on Bell 47 helicopter was $240/hour at Lewistown, MT in October 1986.

4 Phillips Resource Area consists of 2.9 million acres (1.17 million ha). If a biologist surveys 25,000 acres (10,000 ha) in a 6-week period, it will take 24 biologists 5 years to complete the vehicular ground linear survey.

5 Includes 6 weeks of photo interpretation and transferring data, 3 weeks of flying, and 45 hours of helicopter time. The cost of photos was not included because they are a fixed item available to most BLM resource specialists and the cost is shared by a variety of programs.

RECOMMENDATIONS

Helicopters should be used for initial field evaluations. Visibility from helicopters is far superior to that from fixed-wing aircraft. If a helicopter is not available or budgetary restraints do not allow its use, a fixed-wing aircraft can be used. However, the initial field calibration may take longer and only leks with grouse can be observed.

Planes should fly over possible leks so that observers can see the entire locations. Pilots of fixed-wing aircraft have a tendency to fly directly over leks so that observers cannot see the area directly below. Once observers calibrate their techniques with the pilots, a fixed-wing aircraft can be used to finish the field checks.

Photo interpretation should take place as soon as possible after the photos are taken. The photos of Phillips RA were taken in 1977 and were available in January 1978. However, the technique was not developed until May 1978 and interpretation did not take place until the winter of 1978-79. Field checks were carried out over 3 years. If the entire procedure could have been done in one year, the success probably would have been higher than 65 percent.

CIR photos must be taken during the vegetative peak-of-green. At this time, the contrast of the vegetation within and outside the lek is also at its peak. As an example, CIR photography taken in 1977 **before** the peak-of-green, south of the Missouri River but in similar habitat, did not exhibit the contrast necessary to identify the possible leks.

Each area has a unique set of physical features which need to be identified before the interpretation begins. Dry potholes and recently revegetated gas wells were unique to this study area. Potholes were initially the hardest feature to differentiate from leks but though experience and the irregular shape, almost all potholes were eliminated as possible leks before the aerial flights began. Drill pads 150 x 150 feet (40 x 40 m) for gas exploration were identified as leks, but were differentiated from leks because of their square shape and association with a two-track trail (unimproved roads) network. A salt lick, a portable corral, and a mud hole were mistaken for leks. Possible leks located in shrubby vegetation such as sagebrush or rocky areas could be missed due to lack of vegetative contrast inside and outside leks. However, the problem may be less significant than first expected since leks are usually located in areas of low vegetation associated with or surrounded by woody vegetation.

The use of CIR prints rather than black-and-white prints for field verification is preferred for future projects because the black-and-white prints contain less contrast and lose some accuracy in transferring precise lek locations.

SUMMARY

CIR aerial photography was used to identify potential sharp-tailed grouse leks, two-thirds of which were verified on field checks in the following years. The technique proved to be both valuable and cost-effective: the number of known leks in the Phillips RA increased from 30 to 291 as a direct result of using this procedure.

Biologists are often allocated short time periods in which to gather baseline data for the preparation of reports that include items such as sharp-tailed grouse habitat. The use of medium-scale CIR aerial photography allows the biologist time to conduct extensive reconnaissance surveys during the winter months over very large areas. The biologist can then utilize his or her time during the grouse-breeding season from April to mid-May intensively determining crucial sharp-tail habitat over vast areas (i.e., 2.9 million acres [1.17 million ha]) rather than spending all of their time locating a few leks in a small area. This technique has great potential in helping resource specialists identify sharp-tailed grouse leks that could otherwise not be discovered.

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